UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,374	03/30/2004	Ramesh V. Peri	1020.P18414	5495

57035   7590   02/21/2008
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EXAMINER
KANG, INSUN

ART UNIT	PAPER NUMBER
2193	

MAIL DATE	DELIVERY MODE
02/21/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/814,374	PERI ET AL.
	Examiner	Art Unit	
	INSUN KANG	2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _20 November 2007_.
2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-20_ is/are pending in the application.
  4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _1-20_ is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on _20 November 2007_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.
  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  a)☐ All   b)☐ Some * c)☐ None of:
    1.☐ Certified copies of the priority documents have been received.
    2.☐ Certified copies of the priority documents have been received in Application No. _____.
    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is responding to amendment filed on 11/20/2007.

2. Claim 9 has been amended. Claims 1-20 are pending in the application.

Specification

3.   Applicant is reminded of the proper language and format for an abstract of the disclosure.

        The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

        The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

        The abstract filed on 11/20/2007 uses a phrase such as, "Other embodiments are described and claimed in lines 5-6.

Drawings

4.   The drawing filed on 11/20/2007 has been accepted.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6.   Claims 1-8, 11, 13-15, and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated

by Ball et al. ("Efficient Path Profiling," IEEE, pages 1-12, 1996) hereafter Ball.

Per claim 1:

Ball discloses:

-   generating a trace for a subset of program instructions formed from a set of program
    instructions, with said trace comprising a path identifier value, start address, and end
    address (i.e. "The path profiling algorithm first labels edges in a DAG with integer
    values, such that each path from the entry to the exit of the DAG produces a unique
    sum of the edge values along that path," page 4, right col., second paragraph) ;

-   storing said trace in a trace buffer (i.e. "a trace buffer that records branch outcomes,"
    page 4, left col., second paragraph);

-   retrieving said trace from said trace buffer and reproducing said subset of program
    instructions using said trace (i.e. "To recreate a path profile from the path counters
    recorded at run time, it is necessary to map from integer representing a path to the
    path itself...the reconstructed path," page 6, right col., 3.5 Regenerating a Path
    section, lines 1-11).

Per claim 2:

Ball further discloses:

    -receiving an endpoint program instruction for said subset of program instructions

(i.e., page 2, right col., lines 6-9);

- generating said path identifier value and end address for said subset of program

  instructions (i.e. page 2, right col., lines 10-13);

- retrieving said start address from a program counter register (i.e. page 2, right col.,

  second paragraph lines 1-6)

generating said trace using said path identifier value, start address and end address (i.e.

page 5, left col., section 3.2 Compactly Representing Paths with Sums, lines 1-6).

Per claim 3:

Ball further discloses:

- initializing a path identifier register, with said path identifier register to store said end

  address and said path identifier value (i.e. page 6, section 3.4 Instrumentation, second

  paragraph)

- assigning each unconditional branch instruction for said set of program instructions

  an unconditional partial path value and an unconditional offset value (i.e. page 3, left

  col., third paragraph, lines 8-12)

- and assigning each conditional branch instruction for said set of program instructions

  a taken branch partial path value, an untaken branch partial path value, and a

  conditional offset value (i.e. page 2, right col., first paragraph, lines 5-8, 14-15).

Per claim 4:

Ball further discloses:

- receiving a branch and determining whether said branch instruction is a conditional branch instruction or unconditional branch instruction (i.e. page 2, right col., first paragraph, lines 5-8)

- incrementing said path identifier value with said unconditional partial path value and said end address with said unconditional offset value if said branch instruction is an unconditional branch instruction (i.e. page 6, section 3.4 Instrumentation, second paragraph; page 2, Figure 2)

- incrementing said path identifier value with said taken branch partial path value and said end address with said conditional offset value if said branch instruction is a conditional branch instruction that was taken; and incrementing said path identifier value with said untaken branch partial path value and said end address with said conditional offset value if said branch instruction is a conditional branch instruction that was untaken (i.e. "Taking a conditional branch narrows the set of potential paths and corresponds to a transition to a new state," page 2, right col., lines 5-6; "At the end of the loop body…register r holds the index to increment an array of counters," page 2, right col., second paragraph lines 3-6).

Per claim 5:

Ball further discloses:

- comprising initializing said path identifier register prior to processing another conditional branch instruction (i.e. "initializing path register r[r=0] in the ENTRY vertex," page 6, right col., 3.4 Instrumentation, second paragraph, lines 2-3).

Per claim 6:

Ball further discloses:

-said subset of program instructions comprises a function (i.e. "the execution of a local

portion of a program, such as routine," pages 1, right col., paragraph 1).

Per claim 7:

Ball further discloses:

- wherein said path identifier and end address each comprise 32 bits (i.e. "the states can

be represented as 32-bit integers," page 3 right col., section 1.3, second paragraph, line

9).

Per claim 8:

Ball further discloses:

-    wherein said conditional branch instruction and said unconditional branch instruction

     each comprise 32 bits (i.e. "the states can be represented as 32-bit integers," page 3

     right col., section 1.3, second paragraph, line 9).

Per claims 11 and 13, they are the apparatus versions of claim 1, respectively, and are

rejected for the same reasons set forth in connection with the rejection of claim 1 above.

Per claim 14:

Ball discloses:

- a path identifier register (i.e. page 8, section 5.1 Registers, "a local register…to hold the current path," lines 1-4)

- a program counter register (i.e. counter, page 6, left col., 3.4 Instrumentation, second paragraph, line 5)

- and a path identifier generator operatively coupled to said path identifier register and said program counter register, said path identifier generator to receive an endpoint program instruction for said subset of program instructions, to generate said path identifier value and end address for said subset of program instructions using said path identifier register, to retrieve said start address from a program counter register, and generate said trace using said path identifier value, start address and end address (i.e. "initializing path register r[r=0] in the ENTRY vertex," page 6, right col., 3.4 Instrumentation, second paragraph, lines 2-3; page 5, left col., section 3.2 Compactly Representing Paths with Sums, lines 1-6; page 2, right col., lines 10-13).

Per claims 15, 17, and 18, they are the wireless system versions of claims 11, 13, and 14, respectively, and are rejected for the same reasons set forth in connection with the rejection of claims 11, 13, and 14 above.

Per claims 19 and 20 they are another method versions of claims 11, 13, and 14,

respectively, and are rejected for the same reasons set forth in connection with the rejection of

claims 11, 13, and 14 above.

Claim Rejections - 35 USC § 103

7.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

8.   Claims 9, 10, 12, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Ball et al. ("Efficient Path Profiling," IEEE, pages 1-12, 1996) hereafter Ball in view of Mann

(US Patent 6,094,729).

Per claim 9:

Ball does not explicitly teach that said conditional branch instruction and said

unconditional branch instruction further comprise an operation code value to identify a type of

instruction. However, Mann teaches such an operation code value was known in the pertinent

art, at the time applicant's invention was made, to indicate the data type (i.e. col. 3 lines 3-9). It

would have been obvious for one having ordinary skill in the art to modify Ball's disclosed

system to incorporate the teachings of Mann. The modification would be obvious because one

having ordinary skill in the art would be motivated to indicate the data type to identify different

types of instructions fast (i.e. col. 3 lines 3-9).

Per claim 10:

Ball discloses that said trace buffer comprises N entries (i.e. "a trace buffer that records branch outcomes," page 4, left col., second paragraph). Ball does not explicitly teach moving traces from said trace buffer to another storage location after storing N entries. However, Mann teaches it was known in the pertinent art, at the time applicant's invention was made, to move trace data into another storage if desired (i.e. col. 24 lines 5-15). It would have been obvious for one having ordinary skill in the art to modify Ball's disclosed system to incorporate the teachings of Mann. The modification would be obvious because one having ordinary skill in the art would be motivated to move the trace data into memory when the trace buffer is not available for storing the traces (i.e. col. 24 lines 5-15).

Per claim 12, this claim is the apparatus version of the claimed method discussed in claim 10, wherein all claim limitation also have been addressed and/or covered in cited areas as set forth the above.

Per claim 16, this claim is the system version of the claimed method discussed in claim 10, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth the above.

Response to Arguments

9.   Applicant's arguments filed 11/20/2007 have been fully considered but they are not persuasive.

The applicant states that 1): Ball fails to teach generating a trace for a subset of program instructions formed from a set of program instructions as recited in claim 1. The algorithm disclosed in Ball operates on an entire set of instructions while the language of claim 1 clearly states that a trace is generated for a subset of program instructions (remark 12).

In response to 1), both the instant invention and Ball relate to compactly representing traces. Ball's path profiling determines execution frequency of control-flow paths in a routine (page 2, left col., lines 19-21). The sets of potential paths in the routine are identified by the path profiling process (page 2, right col., 1.1. Algorithm Overview, lines 1-3) and a unique path value is associated with each distinct path (page 3, left col., section 1.3, lines 8-13; Figure 6) within the routine. Each path is within the routine and the routine is a portion of a program. Furthermore, the instant specification defines: each trace representing a path of program instructions within a program or function...The path identification value may be generated using an acyclic control flow graph (page 14, 0041). Therefore, the applicant's statement above is not persuasive.

The applicant states that 2): storing branch outcomes in a buffer, as arguably taught by Ball, is clearly different than storing a trace in a trace buffer as recited in claim 1 (remark, 12).

In response, Ball specifically states "a trace buffer that records branch outcomes (page 4, left col., lines 10-11)." The outcome of each two way branch having a different path based on the type of branches is represented in a trace buffer by a bit tracing where the tracing produces representations of paths in the buffer (page 4, left col., lines 7-13).

Conclusion

10.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

11.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to INSUN KANG whose telephone number is (571)272-3724. The

examiner can normally be reached on M-F 8:30-5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Lewis A. Bullock can be reached on 571-272-3759. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent
Application Information Retrieval (PAIR) system. Status information for published applications
may be obtained from either Private PAIR or Public PAIR. Status information for unpublished
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like assistance from a USPTO Customer Service Representative or access to the automated
information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/I. K./
Examiner, Art Unit 2193

/Lewis A. Bullock, Jr./

Supervisory Patent Examiner, Art Unit 2195